KNOWLEDGE, BELIEFS, AND RISK FACTORS FOR OSTEOPOROSIS AMONG AFRICAN-AMERICAN AND HISPANIC WOMEN

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The purpose of this work was to develop and conduct a needs and risk instrument to assess knowledge of osteoporosis risk factors, identify beliefs and attitudes about this disease, and delineate the presence and/or absence of healthy behaviors associated with osteoporosis among African American and Hispanic women.

The survey findings suggest that African-American and Hispanic women are not well-versed in behaviors that would promote and maintain optimal bone mass. Consequently, they are not practicing appropriate lifestyle and dietary habits to decrease their risk of osteoporosis. Such behaviors include inadequate physical activity, inadequate calcium intake, cigarette smoking, and long-term steroid use. Less than 10% of women in the study were getting adequate daily dietary calcium intake, with only 13% taking daily calcium supplements to augment this deficit and less than one-half of women exercising at a minimal level (20 minutes/3 times a week). Women in this study also had limited knowledge about osteoporosis, perceived this condition to be less of a health threat as compared to breast cancer, heart disease, diabetes, and Alzheimer's disease, and very few had the perception that being Hispanic or African American was a factor to consider in assessing their risk of osteoporosis.

Our findings suggest that osteoporosis education and prevention initiatives are needed, specifically for African-American and Hispanic women, to promote healthy behaviors, identify women at-risk, and encourage early diagnosis and treatment. (*J Natl Med Assoc.* 2001;93: 13–21.)

Key words: osteoporosis ◆ risk factors

Osteoporosis is one of the major quality of life threatening diseases for all women, regardless of race or ethnicity, and is a major public health problem. A recent report of more than 48,000 post-menopausal women found that more than one-third to one-half of the women from all racial/ethnic groups studied had low bone mass which placed them at increased risk of osteoporotic fracture.[1] The prevalence and prevention of osteoporosis has been widely documented in white (European American) women. However, recent research has supported the fact that both African-American and Hispanic women are vulnerable populations due to other risk factors apart from those of race/ethnicity, and that African-American and Hispanic women are, in fact, at significant risk for osteoporosis and its sequelae.[2]

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Although African-American and Hispanic women when compared to white women have somewhat higher bone mass,[4] all groups appear to have similar patterns of bone loss five years postmenopause.[5,6] Also, comparable to white women, the rate of hip fractures for African-American and Hispanic women increases exponentially after age 70.[7–10] The National Osteoporosis Risk Assessment Survey (NORA) found that 55.5% of Hispanic and 38% of African American post-menopausal women have low bone density[1] and approximately 15% of Hispanic and 10%–20% of African American postmenopausal women have osteoporosis.[17] This suggests that the relative protection from osteoporosis for African-American and Hispanic women has been overemphasized—older African-American and Hispanic women represent a population at risk for osteoporotic fractures due to a host of risk factors and co-morbidities. Younger African-American and Hispanic women represent a population at the ready for prevention.

Similar to other populations, 80%–95% of fractures in African-American women over age 64 are due to osteoporosis.[2] However, there are increased mortality and morbidity rates associated with osteoporosis for African-American women than white women. For example, despite lower reported rates of hip fractures for African-American women,[2] African-American women who suffer fractures are more likely to be nonambulatory at discharge and twice as likely to die from the hip fracture,[3] compared to 20% of white women who die from hip fracture within the first year.

Strong evidence also indicates that certain lifestyle factors are important determinants of peak bone mass and place women at a greater risk of osteoporosis.[14–16] African-American and Hispanic women (in all age groups) consume less calcium than the Recommended Dietary Allowance[12,17] and inadequate calcium intake among African-American women may be especially problematic given that as many 75% of African Americans and 53% of Hispanic women are lactose-intolerant. Weight-bearing activity performed 3–4 times a week for 30–45 minutes per session has been shown to increase and preserve bone density. However, research[18,19] has shown that minority women are among the least active subgroups in American society. Minority populations, as well as the elderly, living in what they perceive to be "unsafe" neighborhoods are less likely to exercise as compared to people living in "safer" neighborhoods.[20] Smoking is yet another risk factor for osteoporosis, with smokers showing significantly lower bone mass than nonsmokers. While 24% of all women smoke, 40% of the poorest/minority women smoke.[21]

Women with chronic diseases such as sickle-cell anemia, childhood and adult asthma, systemic lupus erythematosus, diabetes mellitus, and hyperthyroidism comprise another high-risk group and both African American and Hispanic women are at particular risk for several of these chronic diseases. The diseases themselves may pose no threat to bone health but the associated therapies (e.g., glucocorticoid therapy) needed to control the symptoms lead to adverse changes in bone. Low-income and minority women also undergo a disproportionate number of premenopausal hysterectomies (with removal of both ovaries), but hormone replacement therapy (HRT) among both groups is quite low.[12] One in nine African-American women over the age of 65 uses HRT compared to 20%–25% of white women.[22]

Osteoporosis is a disease that can be prevented or lessened through primary prevention by engaging in specific healthy behaviors, or through secondary prevention with screening and early diagnosis and treatment. However, most osteoporosis prevention efforts and research protocol have been largely designed with the underlying belief that African-American and Hispanic women had little need to worry about osteoporosis.[14,23]

Our goal was to develop, conduct, and validate a needs and risk instrument to assess knowledge of osteoporosis risk factors, identify beliefs and attitudes about this disease, delineate the presence and/or absence of healthy behaviors, and determine specific barriers impeding risk reduction associated with osteoporosis among African-American and Hispanic women. Ultimately, the results of this survey may provide an increased understanding of risks and the barriers to improving behaviors among a growth population and would serve as the basis for primary and secondary prevention efforts directed at African American and Hispanic communities.

MATERIALS AND METHODS

Data Collection Instrument

This study was conducted at the University of Illinois as a prospective cross-sectional needs and risk assessment among African-American and His-

panic women. A unique field-tested survey instrument was developed: assess knowledge of osteoporosis risk factors, identify beliefs and attitudes about the disease, delineate the presence/absence of healthy behaviors (e.g., exercise, vitamins and calcium intake, eating habits, smoking and alcohol), and determine specific barriers impeding risk reduction associated with the development of osteoporosis. Measures were adapted from previously utilized risk assessment tools as well as from information gleaned from the literature.[12,24-25]

The survey included questions relating to sociodemographic characteristics, gynecological history, height and weight (to calculate body mass index), overall health status and family history. Knowledge toward osteoporosis was assessed with a series of questions directed at the information women had heard and questioning sources where they received such information (e.g., television, radio, health care provider, etc.).[25] Knowledge of risk factors was also assessed by listing 22 factors that may be associated with an increased likelihood of developing osteoporosis. The total number of correctly identified risk factors for osteoporosis for each woman was calculated.

We measured the strength of women's attitudes and beliefs about osteoporosis as compared to a number of other acute and chronic conditions (e.g., heart disease, breast cancer, HIV/AIDS, Alzheimer's disease, diabetes, and the influenza).[25] Four questions were asked: "How concerned are you about getting _____ (disease)?" "How likely are you to get _____ (disease)?" "How serious is _____ (disease)?" "How personally responsible is a person for getting _____ (disease)?" The scale ranged from (not at all concerned, likely, serious, responsible), (somewhat concerned, etc.), to (very concerned, likely, serious, responsible). We calculated mean belief scores for each question to represent the strength of the belief toward each of the diseases/conditions and also calculated statistical differences between osteoporosis belief and the beliefs about the other conditions (e.g., osteoporosis versus breast cancer).

Preventive and risk behaviors were examined with a series of questions asking about exercise, eating habits, vitamin and calcium supplements, medications, and smoking and alcohol use over the past 12 months. We measured exercise level (primarily weight-bearing and high mechanical bone-loading activities) by asking women to recall if they had participated in any of the following nine activities within the past two weeks (e.g., running or jogging, aerobic walking, weight lifting, stair climbing, etc.), how often (frequency), how long (duration), and how vigorously (intensity).[25] For each woman, the minutes exercised were then summed for all the exercises and divided by seven to obtain an average daily rate of exercise. We also analyzed total exercise time both by intensity (moderate-high compared to low intensity).

Dietary calcium intake was assessed utilizing a modification of Kasper et al.[25] For each of 12 calcium rich foods (e.g., milk, yogurt, almonds, etc.), respondents were asked to report on how often they consumed each item (e.g., weekly, rarely, never), as well as their usual serving size (e.g., small, medium, large) with respect to a specified medium portion. To calculate the intake of calcium for each item, the number of servings was multiplied by the serving size endorsed (small, medium or large) and multiplied by the amount of calcium in each serving size for each food item. The total amount of dietary calcium was divided by seven for an average daily intake. Calcium intake was dichotomized as "adequate" (1200 mg daily) or "inadequate" (<1200 mg daily).

Subjects

Given the focus of the study was prevention, the study population was selected from among all women 18 years of age and older (not currently pregnant or breastfeeding) who presented for care at the University of Illinois Women's Care Center, a site which provides ambulatory clinical care to women, and from adjacent service communities within the Chicago's west and south side between February and May of 1999. Premenopausal women were included to assess risk and preventive behaviors prior to peak bone development.

Data Analysis

All coding and data entry were double-coded and double entered for validity. Data for all variables are reported by frequencies and percentages. Nonparametric (chi-square) analyses were conducted on demographic information investigating any differences between African-American and Hispanic women. Though not nominal data, age of the subjects was categorized into four groups to maintain consistency in the analysis of demographic data. For

Table 1. Socio-Demographic Characteristics

Parameter	No. of respondents (n = 206)	Percentage
Race/Ethnicity		
African American	135	65.5
Hispanic	68	33.0
White	3	1.5
Age (yrs)		
18–29	87	42
30–49	79	38
50–65	26	13
>65	14	7
Education		
<12 years	53	26
High school	68	33
Some college	59	29
College	18	9
Graduate school	7	3
Income (annual)		
<$19,000	123	64
$20–39,000	44	21
≥$40,000	24	12
Employment		
Unemployed	117	57
Employed part-time	38	18
Employed full-time	51	25
Marital Status		
Married/Couple	70	34
Never married	103	50
Widowed/Divorced/ Separated	33	16
Insurance		
Medicaid	69	33.5
Managed care	79	38.0
Medicare	21	10.0
Self-pay	23	11.0
Other	14	7.0

belief questions, a mixed-design ANOVA and *t*-tests were conducted comparing differences in African-American and Hispanic women's ratings of beliefs and attitudes about diseases, and comparing within each racial/ethnic group the differences in ratings between osteoporosis and other diseases.

RESULTS

Socio-demographic characteristics of the 206 women that completed the needs assessment are presented in Table 1. Sixty-five percent of women identified themselves as African American, 33% as Hispanic, and 1.5% as white. Eighty percent of the subjects were less than 50 years of age, two-thirds were insured through Medicaid or managed care, only 12% had completed college and/or graduate school, and two-thirds have never been married or are not presently married. Seventy-five percent of the subjects were unemployed or working part-time only and had a family income of less than $20,000 a year (64%).

An assessment of the socio-demographic data revealed that African-American and Hispanic women were equally distributed across age categories and gross income. Racial/ethnic differences were noted in level of education completed, suggesting that African-American women had completed more formal years of education than Hispanic women ($\chi^2(3) = 9.10$, $p < 0.05$). There were also marked differences in marital status for African-American and Hispanic women ($\chi^2(5) = 36.95$, $p < 0.001$). Proportionally, African-American women were six times more likely to be widowed and six times more likely to never have been married. Women in the never been married category were five times more likely to be black than Hispanic women. Lastly, the distribution of insurance coverage varied between the two ethnic groups ($\chi^2(4) = 17.36$, $p < 0.05$), with African-American women nearly six times more likely to report having Medicaid benefits.

Knowledge and Sources of Information

When women were queried regarding their knowledge of osteoporosis, 70% of women knew what osteoporosis was (from a multiple-choice question), however, 30% gave an incorrect answer. Over one-third of women had heard "nothing at all" about the condition and 57% had heard "some" information. The most commonly cited source for receiving information (Table 2) was television (77%), doctor's office (66%), and newspaper/magazine (64%) (women specifically spoke of the "moustache ads for milk"). However, when women were asked their preferences for receiving information, the majority of women would prefer talking with their health care provider as well as taking home handouts. Of the 12 possible sources of information, an average of 2.7 sources was endorsed. The number of sources from which the women obtained information on osteoporosis did not differ by racial/ethnic group.

Our results show that some risk factors for osteoporosis are more readily identifiable than others (Table 3). More than half of the women surveyed

Table 2. Sources of Medical Information

Parameter	No. of respondents	Percentage
Likely to get information (n = 135)*		
TV	104	77
Physician office	89	66
Newspaper/Magazine	86	64
Brochure/Handout	78	58
Health fairs	49	36
Would like to get information (n = 206)*		
Physician office	121	60
Brochure/Handout	110	53
Health fairs	70	34

*Women were able to give three possible answers.

Table 3. Correct Identification of Risk Factors

Risk factors	No. of respondents (n = 206)	Percentage
Family history of osteoporosis	156	76
History of fracture	110	53
Low dietary calcium	142	69
No exercise	139	68
Smoking cigarettes	106	52
Diet high in fat	105	51
Drinking caffeine in excess	78	38
Postmenopausal	75	36
Steroid use	67	32
Small thin body frame	56	27
Lack of sunlight/ Vitamin D	45	22
Oophorectomy	39	19
African-American race	30	15
Amenorrehea	26	13
White non-Hispanic ethnicity	26	13
Hispanic ethnicity	15	7

knew that factors such as a family history of osteoporosis and/or fractures, a diet low in calcium, no exercise and smoking were important risk factors for osteoporosis. However, there were several other prevention factors of which the majority of women were unaware. Only a third of women knew that postmenopausal status increased a woman's risk of osteoporosis, and less than one-third knew that long-term steroid use, small thin body frame, lack of sunlight/vitamin D, oophorectomy, and amenorrhea were also risk factors. Most women believed that race/ethnicity (e.g., African American or Hispanic) was protective for osteoporosis. Of the 22 items, an average of 8.2 factors (37%) were identified correctly, with no differences by race/ethnicity.

Attitudes and Beliefs

Four items assessed womens' attitudes and beliefs toward osteoporosis and six other diseases. Comparisons were made between ratings on attitudes and beliefs for osteoporosis with the other illnesses, for the combined sample of African American and Hispanic women, as well as for between group differences.

For the overall sample (Table 4), several attitudinal differences were noted about osteoporosis as compared to other acute and chronic conditions. Similar to other studies of white women,[28] the African-American and Hispanic women were more concerned about developing heart disease, $t(203) = 5.83$, $p < 0.001$; breast cancer, $t(203) = 7.25$, $p < 0.001$; and diabetes, $t(203) = 2.38$, $p < 0.05$, and also thought it more likely they would develop these conditions (heart disease, $t(203) = 3.65$, $p < 0.001$, breast cancer, $t(203) = 2.88$, $p < 0.01$ and diabetes, $t(203) = 5.71$, $p < 0.001$). The women also thought these diseases to be more serious (heart disease, $t(203) = 7.65$, $p < 0.001$; breast cancer, $t(203) = 6.97$, $p < 0.001$; HIV, $t(203) = 5.96$, $p < 0.001$; and diabetes, $t(203) = 2.20$, $p < 0.05$) and felt that they were more personally responsible for the development of these conditions (heart disease, $t(203) = 2.13$, $p < 0.05$; and HIV, $t(203) = 13.81$, $p < 0.001$) as compared to osteoporosis.

Table 4. Attitudes and Beliefs about Osteoporosis and Other Diseases

Disease	Concerned Mean score (SD)	Likely Mean score (SD)	Serious Mean score (SD)	Responsible Mean score (SD)
Osteoporosis	2.3 (0.76)	1.7 (0.71)	2.7 (0.52)	1.9 (0.76)
Heart disease	2.5 (0.68)	1.9 (0.75)	2.9 (0.29)	2.0 (0.74)
Breast cancer	2.6 (0.63)	1.9 (0.76)	2.9 (0.31)	1.7 (0.80)
Diabetes	2.4 (0.76)	2.1 (0.77)	2.8 (0.51)	1.9 (0.75)
HIV/AIDS	2.3 (0.86)	1.5 (0.72)	2.9 (0.36)	2.7 (0.57)
Alzheimer	2.2 (0.79)	1.7 (0.67)	2.7 (0.54)	1.6 (0.73)
Influenza	2.1 (0.78)	2.1 (0.71)	2.0 (0.73)	1.9 (0.70)

When we further examined attitude questions by race/ethnicity (Table 5), we found that African-American women and Hispanic women did not differ in their attitudes about becoming ill with each disease, although Hispanic women thought it more likely that they would develop osteoporosis, $t(201) = 2.63$, $p < 0.01$ than did African-American women. In general, Hispanic women felt more personally responsible for developing each disease.

Preventive and Risk Behaviors

Preventive and risk behaviors are presented in Table 6. In general, women in this study tended to be very obese. Only 27% of women were within normal range limits of BMI, 32% were pre-obese, and 41% of the population were Class I–III obese.[26] Eighty-three percent of women had gained weight since age 18, an average of 30 pounds, with most of the weight gain between ages 28 and 38. There were no differences by racial/ethnic group.

Although alcohol was not used widely in our sample, cigarette smoking was far more frequent. Only 26% of women reported drinking any alcohol, with the vast majority drinking only monthly or rarely. Forty-two percent of women reported past or current smoking status, on average 4–10 cigarettes per day, with 24% having started before age 14. Half of these women were current smokers. There were no statistical differences by racial/ethnic group. Although the majority of women in this study did not have chronic disease necessitating long-term medical therapy, 12% of women had been using steroids, primarily due to asthma duration of longer than 5 years.

Calcium Intake

We assessed calcium intake both through diet and supplementation (Table 6). The mean daily calcium intake was 474.18 mg of calcium (SD = 331.79). The average daily intake of calcium was not statistically significant by racial/ethnic group. We found that only 8% of women reported having consumed 1000–1200 mg of dietary calcium on a daily basis, with 72% of women having consumed less

Table 5. Differences Between African American and Hispanic Women about Osteoporosis and Other Diseases

	Concern		Likely	
	AA	Hispanic	AA	Hispanic
Disease	Mean score (SD)	Mean score (SD)	Mean score (SD)	Mean score (SD)
Osteoporosis	2.3 (0.75)	2.3 (0.77)	1.7 (0.66)	1.9 (0.78)
Heart disease	2.5 (0.67)	2.5 (0.70)	1.9 (0.72)	2.1 (0.78)
Breast cancer	2.7 (0.58)	2.5 (0.72)	1.9 (0.73)	1.9 (0.82)
Diabetes	2.5 (0.74)	2.3 (0.80)	2.1 (0.76)	2.1 (0.80)
HIV/AIDS	2.3 (0.85)	2.3 (0.90)	1.5 (0.70)	1.5 (0.76)
Alzheimer	2.2 (0.77)	2.2 (0.83)	1.6 (0.62)	1.8 (0.73)
Influenza	2.0 (0.79)	2.0 (0.76)	2.2 (0.70)	2.1 (0.74)

AA = African American.

Table 6. Health Behaviors

	No. of respondents (n = 206)	Percentage
Weight (BMI)		
<25	56	27
25–29.9	67	32
30–40	60	30
>40	23	11
Daily Dietary Calcium		
<600 mg	144	70
600–999 mg	45	22
1000–1200 mg	17	8
Daily Supplements		
Multivitamin	57	28
Calcium	27	13
Daily Smoking		
1–3 cigarettes	29	14
4–10 cigarettes	41	20
11–40 cigarettes	16	8
Daily Exercise		
<20 minutes	115	56
20–30 minutes	41	20
>30 minutes	50	24

than half of their daily calcium requirement. This apparent calcium deficit was not compensated for by calcium supplementation. Only 42% of women reported taking calcium supplements and only 13% on a daily basis.

Exercise

Exercise patterns were similarly inadequate to promote and maintain good bone health (Table 6). Overall, only 44% of women in this study exercised 3 times a week/20 minutes per session with only 25% of these women at high intensity, and this did not differ significantly by racial/ethnic group. When we examined exercise patterns by age group we found that 85% of women who exercised regularly were between 18–49 years of age (49%, 18–29; 36%, 30–49). Only 15% of women older than 50 were routinely exercising.

DISCUSSION

Because there is no cure for osteoporosis, primary prevention of the disease through increased awareness of risk factors and preventative behaviors is potentially important. However, our findings suggest that African-American and Hispanic women are not well versed in behaviors that would promote and maintain optimal bone mass, and consequently are not practicing lifestyle and dietary habits sufficient to decrease the risk of osteoporosis.

Less than 10% of women in the study were getting adequate daily dietary calcium intake and only 13% were taking daily calcium supplements to augment this deficit. Although other recent studies indicate that many adults get only half or less of their daily calcium requirement,[12] this sample of women suggests dramatically lower intake. Also, smoking was quite prevalent in our study population. Smoking not only lowers bone mass density but is associated with an earlier onset of menopause of about 2 years, thus accelerating the rate of bone loss.[21]

Exercise levels among this sample of women were similarly inadequate to promote and maintain good bone health. Less than one-half of women exercised at a minimal level, with only half of these women

Table 5. (Continued)

Serious		Responsible	
AA	Hispanic	AA	Hispanic
Mean score (SD)	Mean score (SD)	Mean score (SD)	Mean score (SD)
2.6 (0.54)	2.7 (0.48)	1.8 (0.71)	2.0 (0.83)
2.9 (0.29)	2.9 (0.29)	1.9 (0.70)	2.2 (0.78)
2.9 (0.29)	2.9 (0.35)	1.6 (0.73)	1.9 (0.87)
2.8 (0.47)	2.7 (0.57)	1.8 (0.73)	2.1 (0.76)
3.0 (0.22)	2.8 (0.53)	2.7 (0.52)	2.7 (0.66)
2.7 (0.54)	2.7 (0.54)	1.5 (0.68)	1.7 (0.79)
2.1 (0.73)	1.9 (0.72)	1.9 (0.67)	1.9 (0.77)

AA = African American

having exercised at moderate-high intensity. As the women aged, their physical activity level declined rapidly, with only 15% of women older than 50 exercising regularly. Other published works[18,19] have shown that minority women are among the least active subgroups in American society. Additionally, the prevalence of physical inactivity is highest for African-American and Hispanic women compared to white women.

Although higher initial BMI is thought to confer some possible protection against osteoporosis, the percentage of morbidly obese women in our study presents a number of other concerns such as greater inclination to sedentary lifestyles, with sedentary women having less bone mass than age-matched exercising women.[27,28] In addition, a sedentary lifestyle puts women at increased risk for other co-morbid conditions.

Steroid use (inhaled and oral) in this population appears high, given that the majority of women were less than 50 years of age and had been taking corticosteroids for 5 years or longer. When taken long term, as in our sample, doses as low as of 7.5 mg/day greatly increases the risk of developing osteoporosis.[29] Recent evidence suggests that lower doses and even inhaled steroids significantly increases risk. In fact, corticosteroid-induced osteoporosis is the most common form of secondary osteoporosis, causing earlier fractures in approximately 30% of individuals who use these drugs for an average of 5 years.[30]

Other studies support our findings that although most women rely on their physicians for medical information and advice, women are reluctant to initiate discussions about menopause and aging issues with their physicians[31] and feel communication is poor when they do.[32] However, research suggests that most providers are not giving women the information they need to implement sound prevention and treatment strategies.[28,33] Given that studies show that there is a significant relationship between receiving osteoporosis information and the ability to correctly identify risk factors and invest in prevention efforts, it would seem appropriate that health care providers should play a major role in supplying information about osteoporosis.

As for attitudes about the health threat of osteoporosis compared to other diseases, the women in this study believed osteoporosis to be less of a health threat than heart disease, breast cancer and diabetes. Statistically, 1 in 8 (12.5%) women will develop breast cancer in their lifetime, but greater than 50% of women will have low bone mass, be at risk for fracture, and develop osteopenia or osteoporosis. In the U.S., the incidence of hip fracture is equal to the combined risks of breast, endometrial, and ovarian cancer.[34] The majority of women in this study placed a much greater significance to the risk and seriousness of developing breast cancer than to osteoporosis, however, the reality is that more women will die of secondary hip fracture than from breast cancer.[34]

Only 12%–14% of women in our study perceived being Hispanic or African American was a risk factor for osteoporosis. Other research has also shown that minority women do not identify race/ethnicity as a possible risk factor.[1] In the NORA survey, only 9.7% of Hispanic women indicated being Hispanic as a risk factor for osteoporosis, although Hispanic women were found to be at the highest risk of osteoporosis, with 55.5% of women having a low bone mass density.[37]

CONCLUSION

The results of this survey provide an increased understanding of the beliefs, risks and barriers to improving health behaviors of African-American and Hispanic women. The findings provide us with an appreciation of the unique needs and specific risk factors relevant to each element of the target population from which primary and secondary prevention efforts can be developed specifically for minority women. Every woman regardless of race/ethnicity and her "assumed risk" should have knowledge about osteoporosis prevention, be aware of prevention strategies and have the choice and opportunity to include them into her lifestyle.

This study suggests that osteoporosis education and prevention initiatives are needed specifically for African American and Hispanic women to promote healthy behaviors, identify women-at-risk, and encourage early diagnosis and treatment. Many of the risk factors for osteoporosis are modifiable. It is important to design educational approaches that are culturally- and ethnically-sensitive and that propose interventions that are acceptable and practical. One next logical step would be determining if those women not using preventive health strategies are in fact at increased risk for osteopenia and osteoporosis. We recommend peri/postmenopausal women receive peripheral and full DEXA testing (given the

paucity of published correlational data among minority women). Based on this information, secondary prevention efforts, including information on injury and fall prevention, hormone replacement therapy, and/or the use of bisphosphonates and other therapeutic options, can be encouraged where appropriate. Several of these options have been proven effective for preventing, slowing, and even reversing bone loss.

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